BEHIND THE WEBB- GOLDEN TOUCH

Mirrors on a telescope are often coated with some kind of metal in order to reflect as much light as possible. Now the kind of metal depends upon the type of light the telescope is looking at. The James Webb Space Telescope is looking at infrared light and for that, gold is the ideal choice. To find out how the gold is put onto the mirrors of the James Webb Space Telescope, we're here at Quantum Coating in Moorestown New Jersey.

So Ian how much gold are we talking about? Enough for a ring?

**Ian Stevenson/Director of Coating Services**: Not even that? Well, it depends on how big your ring is, of course. But the thickness of the coating is almost unimagineably small. To give an example, this piece of paper is 1/1000$^{th}$ of an inch. We could take 1000 gold coatings stack them all side by side and they would be the thickness of this piece of paper. In terms of the amount of gold that we need, it comes to 3 grams of material.

And 3 grams look like this… wow, that's amazing. Considering how big the mirror is.

That amount, when it's spread out thin enough covers the whole surface of the hexagon.

When you apply the coating, are we talking about a paint job?

No, this is called vacuum deposition. It happens in a chamber where all the air's been sucked out to create a vacuum and we vaporize the gold. We create a cloud of vapor and that vapor condenses on the surface to form the film.

And why do you choose to apply the gold that way?

That's the way to get the maximum reflection. Spray painting or other techniques wouldn't give us enough reflection.

Can we actually see the gold being applied to a mirror?

Sure, Ty's the guy who operates the coating machine. He'd be happy to show you how that works.

Hey Ty. I was told that a coating process is about to start.

**Tyrone Wilson/Coating Chamber Technician:** Sure, we're about to start the coating soon.

Can we tag along?

Sure…. What we're doing here now… we're preparing a mirror for coating. Cleaning the mirror of any contaminants or any particles that could be on the mirror.

So Ty, what's going on here now?

Ok now, we're putting on the shield and the masks on the mirror because we don't want any coating to get on the sides of the mirror and the coating cannot be beyond a certain area on the mirror.

So you want the gold to just be on the surface, nothing on the sides or anything.

Right. There's also a bevel on the edge of the mirror. We don't want any coating on the bevel either.

How long is this going to take?

Maybe an hour in total.

So I understand there are no cameras in the chamber. Can we see what's going on?

We take a look inside our view port. We see the part rotating and the glow disperse right now.

So Ty, we couldn't show the actual company specific that used to apply the coating but we get to see the gold coated mirror, fresh out of the chamber!

Yeah, it's neat. Look at it. The mirror's coated now and we're all completed. We're ready to ship it off to the customer and he can begin their testing.

Well thanks so much for guiding us through your coating process. It was fascinating.

Not a problem at all.

So, as you can see, gold isn't just a fashion accessory for the James Webb Space Telescope but a critical addition to making the observatory work it's very best. Thanks for joining us for this edition of Behind the Webb.